MATHEMATICS CROSSWALK
2008 MATHEMATICS STANDARD TO 2003 MATHEMATICS STANDARD
HIGH SCHOOL (GRADES 9 AND 10)

		MATHEMATICS STANDARD ARTICULATED BY GRADE LEVEL			
		Strand 1: Number and Operations			
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**	
1. Number Sense	1	Justify with examples the relation between the number system being used (natural numbers, whole numbers, integers, rational numbers and irrational numbers) and the question of whether or not an equation has a solution in that number system.	1	Classify real numbers as members of one or more subsets: natural, whole, integers, rational, or irrational numbers.	
	2	Sort sets of numbers as finite or infinite, and justify the sort.	3	Distinguish between finite and infinite sets of numbers.	
	3	*Express that the distance between two numbers is the absolute value of their difference.*			
	MHS-S1C2-02	**Moved to Strand 1 Concept 2**	2	Identify properties of the real number system: commutative, associative, distributive, identity, inverse, and closure.	
2. Numerical Operations	1	Solve word problems involving absolute value, powers, roots, and scientific notation.	1	Select the grade-level appropriate operation to solve word problems.	
			2	Solve word problems using grade-level appropriate operations and numbers.	
	2	Summarize the properties of and connections between real number operations; justify manipulations of expressions using the properties of real number operations.	3	Simplify numerical expressions including signed numbers and absolute values.	
			7	Simplify numerical expressions using the order of operations.	
			MHS-S1C1-02	Identify properties of the real number system: commutative, associative, distributive, identity, inverse, and closure.	
	3	Calculate powers and roots of rational and irrational numbers.	MHS-S3C3-14	Calculate powers and roots of real numbers, both rational and irrational, using technology when appropriate.	
	4	Compute using scientific notation.	6	Compute using scientific notation.	

* This performance objective is new to the 2008 Mathematics Standard Articulated by Grade Level.

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colspan Strand 1: Number and Operations				
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
2. Numerical Operations	MHS-S3C1-03	**Moved to Strand 3 Concept 1**	4	Apply subscripts to represent ordinal position.
	MHS-S5C2-02	**Moved to Strand 5 Concept 2**	5	Use grade level-appropriate mathematical terminology.
3. Estimation	1	Determine rational approximations of irrational numbers.	3	Determine rational approximations of irrational numbers.
	2	Use estimation to determine the reasonableness of a solution.	2	Determine if a solution to a problem is reasonable.
	3	*Determine when an estimate is more appropriate than an exact answer.*		
	4	Estimate the location of the rational or irrational numbers on a number line.	3	Determine rational approximations of irrational numbers.
	M08-S1C3-01	**Moved to Grade 8**	1	Solve grade-level appropriate problems using estimation.

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MATHEMATICS CROSSWALK
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Strand 2: Data Analysis, Probability, and Discrete Mathematics				
CONCEPT	2008 PO	ITEM DESCRIPTION	2003 PO	ITEM DESCRIPTION
1. Data Analysis (Statistics)	1	Draw inferences about data sets from lists, tables, matrices, and plots.	9	Draw inferences from charts, tables, graphs, plots, or data sets.
	2	Organize collected data into an appropriate graphical representation with or without technology.	2	Organize collected data into an appropriate graphical representation.
	3	Display data, including paired data, as lists, tables, matrices, and plots with or without technology; make predictions and observations about patterns or departures from patterns.	3	Display data as lists, tables, matrices, and plots.
			4	Construct equivalent displays of the same data.
			7	Make reasonable predictions based upon linear patterns in data sets or scatter plots.
			8	Make reasonable predictions for a set of data, based on patterns.
			14	Determine whether displayed data has positive, negative, or no correlation.
			15	Identify a normal distribution.
	4	Make inferences by comparing data sets using one or more summary statistics.	10	Apply the concepts of mean, median, mode, range, and quartiles to summarize data sets.
	5	Determine which measure of center is most appropriate in a given situation and explain why.	6	Identify which of the measures of central tendency is most appropriate in a given situation.
	6	Evaluate the reasonableness of conclusions drawn from data analysis.	11	Evaluate the reasonableness of conclusions drawn from data analysis.
	7	Identify misrepresentations and distortions in displays of data and explain why they are misrepresentations or distortions.	5	Identify graphic misrepresentations and distortions of sets of data.
	8	*Design simple experiments or investigations and collect data to answer questions.*		
		REMOVED	1	Formulate questions to collect data in contextual situations.

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MATHEMATICS CROSSWALK
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CONCEPT	2008 PO	ITEM DESCRIPTION	2003 PO	ITEM DESCRIPTION
Strand 2: Data Analysis, Probability, and Discrete Mathematics				
1. Data Analysis (Statistics)	MCWR-S2C1-04	**Moved to College Work Readiness**	12	Recognize and explain the impact of interpreting data (making inferences or drawing conclusions) from a biased sample.
	MCWR-S2C1-08	**Moved to College Work Readiness**	13	Draw a line of best fit for a scatter plot.
		REMOVED	16	Identify differences between sampling and census.
	M08-S2C1-04	**Moved to Grade 8**	17	Identify differences between biased and unbiased samples.
2. Probability	1	Make predictions and solve problems based on theoretical probability models.	1	Find the probability that a specific event will occur, with or without replacement.
			3	Predict the outcome of a grade-level appropriate probability experiment.
	2	Determine the theoretical probability of events, estimate probabilities using experiments, and compare the two.	4	Record the data from performing a grade-level appropriate probability experiment.
			5	Compare the outcome of an experiment to predictions made prior to performing the experiment.
			7	Compare the results of two repetitions of the same grade-level appropriate probability experiment.
			MHS-S1C3-01	Solve grade-level appropriate problems using estimation.
	3	Use simulations to model situations involving independent and dependent events.	6	Distinguish between independent and dependent events.
	4	*Explain and use the law of large numbers (that experimental results tend to approach theoretical probabilities after a large number of trials).*		
	5	Use concepts and formulas of area to calculate geometric probabilities.	2	Determine simple probabilities related to geometric figures.

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Strand 2: Data Analysis, Probability, and Discrete Mathematics				
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
3. Systematic Listing and Counting	1	*Apply the addition and multiplication principles of counting, representing these principles algebraically using factorial notation.*		
	2	Apply appropriate means of computing the number of possible arrangements of items using permutations where order matters, and combinations where order does not matter.	2	Determine when to use combinations versus permutations in counting objects.
			3	Use combinations or permutations to solve contextual problems.
	3	Determine the number of possible outcomes of an event.	1	Determine the number of possible outcomes for a contextual event using a chart, a tree diagram, or the counting principle.
4. Vertex-Edge Graphs	1	*Solve network problems using graphs and matrices.*		

Strand 3: Patterns, Algebra, and Functions				
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
1. Patterns	1	Recognize, describe, and analyze sequences using tables, graphs, words, or symbols; use sequences in modeling.	1	Communicate a grade-level appropriate iterative or recursive pattern, using symbols or numbers.
	2	Determine a specific term of a sequence.	2	Find the nth term of an iterative or recursive pattern.
	3	Create sequences using explicit and recursive formulas involving both subscripts and function notation.	3	Evaluate problems using basic recursion formulas.
			MHS-S1C2-04	Apply subscripts to represent ordinal position.

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Strand 3: Patterns, Algebra, and Functions				
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
2. Functions and Relationships	1	Sketch and interpret a graph that models a given context, make connections between the graph and the context, and solve maximum and minimum problems using the graph.	2	Describe a contextual situation that is depicted by a given graph.
			3	Identify a graph that models a given real-world situation.
			4	Sketch a graph that models a given contextual situation.
			6	Determine the solution to a contextual maximum/minimum problem, given the graphical representation.
	2	Determine if a relationship represented by an equation, graph, table, description, or set of ordered pairs is a function.	1	Determine if a relationship is a function, given a graph, table, or set of ordered pairs.
	3	Use function notation; evaluate a function at a specified value in its domain.	MHS-S3C3-01	Evaluate algebraic expressions, including absolute value and square roots.
	4	Use equations, graphs, tables, descriptions, or sets of ordered pairs to express a relationship between two variables.	7	Express the relationship between two variables using tables/matrices, equations, or graphs.
			8	Interpret the relationship between data suggested by tables/matrices, equations, or graphs.
			MHS-S3C3-05	Translate a sentence written in context into an algebraic equation involving multiple operations.
			MHS-S3C3-07	Write a linear algebraic sentence that represents a data set that models a contextual situation.
	5	Recognize and solve problems that can be modeled using a system of two equations in two variables.	MHS-S3C3-12	Solve systems of linear equations in two variables (integral coefficients and rational solutions).
	6	Recognize and solve problems that can be modeled using a quadratic function.	MHS-S3C3-17	Solve quadratic equations.

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MATHEMATICS CROSSWALK
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Strand 3: Patterns, Algebra, and Functions				
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
2. Functions and Relationships	7	Determine domain and range of a function from an equation, graph, table, description, or set of ordered pairs.	5	Determine domain and range for a function.
	MHS-S3C3-04	**Moved to Strand 3 Concept 3**	9	Determine from two linear equations whether the lines are parallel, perpendicular, coincident, or intersecting but not perpendicular.
3. Algebraic Representations	1	Create and explain the need for equivalent forms of an equation or expression.	4	Translate a written expression or sentence into a mathematical expression or sentence.
			5	Translate a sentence written in context into an algebraic equation involving multiple operations.
	2	Solve formulas for specified variables.	MHS-S3C4-02	Solve formulas for specified variables.
	3	Write an equation given a table of values, two points on the line, the slope and a point on the line, or the graph of the line.	6	Write a linear equation for a table of values.
			10	Write an equation of the line given: two points on the line, the slope and a point on the line, or the graph of the line.
	4	Determine from two linear equations whether the lines are parallel, perpendicular, coincident, or intersecting but not perpendicular.	MHS-S3C2-09	Determine from two linear equations whether the lines are parallel, perpendicular, coincident, or intersecting but not perpendicular.
	5	Solve linear equations and equations involving absolute value, with one variable.	8	Solve linear (first degree) equations in one variable (may include absolute value).
			11	Solve an algebraic proportion.
	6	Solve linear inequalities in one variable.	9	Solve linear inequalities in one variable.
	7	Solve systems of two linear equations in two variables.	12	Solve systems of linear equations in two variables (integral coefficients and rational solutions).
	8	Simplify and evaluate polynomials, rational expressions, expressions containing absolute value, and radicals.	2	Simplify algebraic expressions.
			15	Simplify square roots and cube roots with monomial radicands (including those with variables) that are perfect squares or perfect cubes.

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		Strand 3: Patterns, Algebra, and Functions		
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
3. Algebraic Representations	9	Multiply and divide monomial expressions with integer exponents.	3	Multiply and divide monomial expressions with integral exponents.
	10	*Add, subtract, and multiply polynomial and rational expressions.*		
	11	Solve square root equations involving only one radical.	16	Solve square root radical equations involving only one radical.
	12	*Factor quadratic polynomials in the form of $ax^2 + bx + c$ where a, b, and c are integers.*		
	13	Solve quadratic equations.	11	Solve an algebraic proportion.
			17	Solve quadratic equations.
	14	*Factor higher order polynomials.*		
	15	Solve problems using operations with matrices.	13	Add, subtract, and perform scalar multiplication with matrices.
	MHS-S3C2-03	**Moved to Strand 3 Concept 2**	1	Evaluate algebraic expressions, including absolute value and square roots.
	MHS-S3C2-04	**Moved to Strand 3 Concept 2**	7	Write a linear algebraic sentence that represents a data set that models a contextual situation.
	MHS-S1C2-03	**Moved to Strand 1 Concept 2**	14	Calculate powers and roots of real numbers, both rational and irrational, using technology when appropriate.
	MHS-S4C1-11	**Moved to Strand 4 Concept 1**	18	Identify the sine, cosine, and tangent ratios of the acute angles of a right triangle.
4. Analysis of Change	1	Determine the slope and intercepts of the graph of a linear function, interpreting slope as a constant rate of change.	1	Determine slope, x-, and y-intercepts of a linear equation.
	2	*Solve problems involving rate of change.*		
	3	*Solve interest problems.*		
	MHS-S3C3-02	**Moved to Strand 3 Concept 3**	2	Solve formulas for specified variables.

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		Strand 4: Geometry and Measurement		
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
1. Geometric Properties	1	Use the basic properties of a circle (relationships between angles, radii, intercepted arcs, chords, tangents, and secants) to prove basic theorems and solve problems.	7	Solve problems by applying the relationship between circles, angles, and intercepted arcs.
			8	Solve problems by applying the relationship between radii, diameters, chords, tangents, or secants.
	2	Visualize solids and surfaces in 3-dimensional space when given 2-dimensional representations and create 2-dimensional representations for the surfaces of 3-dimensional objects.	3	Make a net to represent a 3-dimensional object.
			4	Make a 3-dimensional model from a net.
			5	Draw 2-dimensional and 3-dimensional figures with appropriate labels.
	3	Create and analyze inductive and deductive arguments concerning geometric ideas and relationships.	MHS-S5C2-07	Create inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.
			MHS-S5C2-08	Critique inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.
	4	*Apply properties, theorems, and constructions about parallel lines, perpendicular lines, and angles to prove theorems.*		
	5	*Explore Euclid's five postulates in the plane and their limitations.*		
	6	Solve problems using angle and side length relationships and attributes of polygons.	1	Identify the attributes of special triangles (isosceles, equilateral, right).
			6	Solve problems related to complementary, supplementary, or congruent angle concepts.
			14	Solve contextual situations using angle and side length relationships.
			M08-S4C4-05	Find the measure of a missing interior angle in a triangle or quadrilateral.

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HIGH SCHOOL (GRADES 9 AND 10)

CONCEPT	2008 PO	ITEM DESCRIPTION	2003 PO	ITEM DESCRIPTION
Strand 4: Geometry and Measurement				
1. Geometric Properties	7	Use the hierarchy of quadrilaterals in deductive reasoning.	2	Identify the hierarchy of quadrilaterals.
	8	Prove similarity and congruence of triangles.	11	Determine when triangles are congruent by applying SSS, ASA, AAS, or SAS.
			12	Determine when triangles are similar by applying SAS, SSS, or AA similarity postulates.
	9	Solve problems using the triangle inequality property.	9	Solve problems using the triangle inequality property.
			M07-S4C1-09	Model the triangle inequality theorem using manipulatives.
			M08-S4C1-09	Determine whether three given lengths can form a triangle.
	10	Solve problems using right triangles, including special triangles.	10	Solve problems using special case right triangles.
	11	Solve problems using the sine, cosine, and tangent ratios of the acute angles of a right triangle.	MHS-S3C3-18	Identify the sine, cosine, and tangent ratios of the acute angles of a right triangle.
	M05-S4C1-01	**Moved to Grade 5**	13	Construct a triangle congruent to a given triangle.
2. Transformation of Shapes	1	Determine whether a transformation of a 2-dimensional figure on a coordinate plane represents a translation, reflection, rotation, or dilation and whether congruence is preserved.	4	Determine whether a given pair of figures on a coordinate plane represents a translation, reflection, rotation, or dilation.
	2	Determine the new coordinates of a point when a single transformation is performed on a 2-dimensional figure.	3	Determine the new coordinates of a point when a single transformation is performed on a planar geometric figure.
	3	Sketch and describe the properties of a 2-dimensional figure that is the result of two or more transformations.	1	Sketch the planar figure that is the result of two or more transformations.
			2	Identify the properties of the planar figure that is the result of two or more transformations.
			5	Classify transformations based on whether they produce congruent or similar figures.

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Strand 4: Geometry and Measurement				
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
2. Transformation of Shapes	4	Determine the effects of a single transformation on linear or area measurements of a 2-dimensional figure.	6	Determine the effects of a single transformation on linear or area measurements of a planar geometric figure.
3. Coordinate Geometry	1	Determine how to find the midpoint between two points in the coordinate plane.	5	Determine the midpoint between two points in a coordinate system.
	2	*Illustrate the connection between the distance formula and the Pythagorean Theorem.*		
	3	Determine the distance between two points in the coordinate plane.	7	Determine the distance between two points in the coordinate system.
	4	Verify characteristics of a given geometric figure using coordinate formulas for distance, midpoint, and slope to confirm parallelism, perpendicularity, and congruence.	MHS-S5C2-14	Verify characteristics of a given geometric figure using coordinate formulas such as distance, mid-point, and slope to confirm parallelism, perpendicularity, and congruency.
	5	Graph a linear equation or linear inequality in two variables.	2	Graph a linear equation in two variables.
			3	Graph a linear inequality in two variables.
	6	Describe how changing the parameters of a linear function affect the shape and position of its graph.	6	Determine changes in the graph of a linear function when constants and coefficients in its equation are varied.
	7	Determine the solution to a system of linear equations in two variables from the graphs of the equations.	4	Determine the solution to a system of equations in two variables from a given graph.
	8	Graph a quadratic function and interpret *x*-intercepts as zeros.	1	Graph a quadratic equation with lead coefficient equal to one.
4. Measurement	1	Use dimensional analysis to keep track of units of measure when converting.	M07-S4C4-03	Converts measurement from U.S. Customary to metric, and vice versa.
	2	Find the length of a circular arc; find the area of a sector of a circle.	5	Find the length of a circular arc.
			6	Find the area of a sector of a circle.
	3	Determine the effect that changing dimensions has on the perimeter, area, or volume of a figure.	4	Compare perimeter, area, or volume of figures when dimensions are changed.

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Strand 4: Geometry and Measurement				
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
4. Measurement	4	Solve problems involving similar figures using ratios and proportions.	9	Solve scale factor problems using ratios and proportions.
			10	Solve applied problems using similar triangles.
	5	Calculate the surface area and volume of 3-dimensional figures and solve for missing measures.	2	Calculate the volumes of 3-dimensional geometric figures.
			3	Calculate the surface areas of 3-dimensional geometric figures.
			7	Solve for missing measures in a pyramid (i.e., slant height, height).
	M07-S4C1-04	**Moved to Grade 7**	8	Find the sum of the interior and exterior angles of a polygon.
		REMOVED - exterior angles	8	Find the sum of the interior and exterior angles of a polygon.
	M07-S4C4-03	**Moved to Grade 7**	1	Calculate the area of geometric shapes composed of two or more geometric figures.

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Strand 5: Structure and Logic				
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
1. Algorithms and Algorithmic Thinking	1	Select an algorithm that explains a particular mathematical process; determine the purpose of a simple mathematical algorithm.	4	Select an algorithm that explains a particular mathematical process.
			5	Determine the purpose of a simple mathematical algorithm.
	2	Analyze algorithms for validity and equivalence recognizing the purpose of the algorithm.	1	Determine whether a given procedure for simplifying an expression is valid.
			2	Determine whether a given procedure for solving an equation is valid.
			3	Determine whether a given procedure for solving a linear inequality is valid.
			6	Determine whether given simple mathematical algorithms are equivalent.
2. Logic, Reasoning, Problem Solving, and Proof	1	*Analyze a problem situation, determine the question(s) to be answered, organize given information, determine how to represent the problem, and identify implicit and explicit assumptions that have been made.*		
	2	Solve problems by formulating one or more strategies, applying the strategies, verifying the solution(s), and communicating the reasoning used to obtain the solution(s).	MHS-S1C2-01	Select the grade-level appropriate operation to solve word problems.
			MHS-S1C2-02	Solve word problems using grade-level appropriate operations and numbers.
			MHS-S1C2-05	Use grade level-appropriate mathematical terminology.
	3	Evaluate a solution for reasonableness and interpret the meaning of the solution in the context of the original problem.	4	Analyze assertions related to a contextual situation by using principles of logic.
			6	Distinguish valid arguments from invalid arguments.

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Strand 5: Structure and Logic				
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
2. Logic, Reasoning, Problem Solving, and Proof	4	*Generalize a solution strategy for a single problem to a class of related problems; explain the role of generalizations in inductive and deductive reasoning.*		
	5	Summarize and communicate mathematical ideas using formal and informal reasoning.	7	Create inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.
	6	Synthesize mathematical information from multiple sources to draw a conclusion, make inferences based on mathematical information, evaluate the conclusions of others, analyze a mathematical argument, and recognize flaws or gaps in reasoning.	8	Critique inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.
	7	*Find structural similarities within different algebraic expressions and geometric figures.*		
	8	Use inductive reasoning to make conjectures, use deductive reasoning to analyze and prove a valid conjecture, and develop a counterexample to refute an invalid conjecture.	3	Write an appropriate conjecture given a certain set of circumstances.
			5	Identify a valid conjecture using inductive reasoning.
			9	Identify a counterexample for a given conjecture.
			10	Construct a counterexample to show that a given conjecture is false.
	9	State the inverse, converse, and contrapositive of a given statement and state the relationship between the truth value of these statements and the original statement.	11	State the inverse, converse, or contrapositive of a given statement.
			12	Determine if the inverse, converse, or contrapositive of a given statement is true or false.

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		Strand 5: Structure and Logic		
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
2. Logic, Reasoning, Problem Solving, and Proof	10	List related *if… then* statements in logical order.	2	List related *if… then* statements in logical order.
	11	Draw a simple valid conclusion from a given *if…then* statement and a minor premise.	1	Draw a simple valid conclusion from a given *if…then* statement and a minor premise.
	12	Construct a simple formal deductive proof.	13	Construct a simple formal or informal deductive proof.
	13	*Identify and explain the roles played by definitions, postulates, propositions and theorems in the logical structure of mathematics, including Euclidean geometry.*		
	MHS-S4C3-04	**Moved to Strand 4 Concept 3**	14	Verify characteristics of a given geometric figure using coordinate formulas such as distance, mid-point, and slope to confirm parallelism, perpendicularity, and congruency.

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